



- Notes :
1. All questions carry marks as indicated.
  2. Solve Question 1 OR Questions No. 2.
  3. Solve Question 3 OR Questions No. 4.
  4. Solve Question 5 OR Questions No. 6.
  5. Solve Question 7 OR Questions No. 8.
  6. Solve Question 9 OR Questions No. 10.
  7. Solve Question 11 OR Questions No. 12.
  8. Assume suitable data whenever necessary.
  9. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Give and explain in brief find Intersections (s) algorithm. 7
- b) Differentiate between. 6
- i) Classical and computational geometry.
  - ii) Plane and 3D line.
  - iii) Convex and concave in context of computational geometry.

**OR**

2. a) Discuss two fields of application of computational geometry highlighting why classical geometry can't be applied in such field. 7
- b) Prove or disprove. The dual graph of the triangulation of a monotone polygon is always a chain, that is, any node in this graph has degree at most two. 6
3. a) Contrast chain and slab methods for Location of a point in a plane subdivision highlighting data structure employed and computational complexity. 7
- b) Consider a triangle ABC described by vectors  $\vec{AB}$ ,  $\vec{BC}$  and  $\vec{AC}$ . Explain how to derive equation of a plane containing this triangle with the information supplied. If the above information is not sufficient, what more information would be required. 7

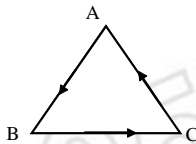


Fig. Q.3(b)

**OR**

4. a) Differentiate between. 10
- i) Incremental linear programming and Randomized linear programming.
  - ii) Plane and 3D line.
- b) Discuss in brief one-dimensional range searching problem. 4

5. a) Discuss hidden line problem and an algorithm for the same. 7  
b) What is voronoi diagram? Give the application of voronoi diagram. 6

**OR**

6. a) Find uniformly spaced 5 points on the arc of the circle in the second quadrant, where equation of the circle is  $x^2 + y^2 = 26.01$  6  
b) Derive the transformation matrix for equation about the origin through an angle ' $\theta$ ' 7
7. a) What is triangulation? Describe the following. 9  
i) Angular triangulation.  
ii) Point-set triangulation.
- b) Differentiate between data structure and Geometric data structure. 4

**OR**

8. a) What is priority search trees? Explain with suitable example. 7  
b) Explain interval trees. 6
9. a) What is convex hulls? How to compute complexity of convex hulls in 3-space. 7  
b) Discuss quick hull technique with help of a suitable example. 6

**OR**

10. a) Give an algorithm that uses the BSP tree to report all the faces of the subdivision intersected by axis-parallel query rectangle. 7  
b) Discuss the advantages and dis-advantage of BSP trees over Kd-trees. 6
11. a) Define quadtrees for point sets. Give example. 7  
b) Explain the significance of multi-level partition trees. 7

**OR**

12. a) Write short note on simplex Range searching? 7  
b) Compare and contrast between uniform meshes and non-uniform meshes. 7

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